

OIE Reference Laboratory Reports Activities

Activities in 2019

This report has been submitted : 2020-01-15 10:57:38

Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Foot and mouth disease
Address of laboratory:	Ash Road, Pirbright Woking, Surrey, GU24 0NF UNITED KINGDOM
Tel.:	+44-1483 23.10.21
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E-mail address:	donald.king@pirbright.ac.uk
Website:	www.wrlfmd.org and https://www.pirbright.ac.uk
Name (including Title) of Head of Laboratory (Responsible Official):	Dr Bryan Charleston
Name (including Title and Position) of OIE Reference Expert:	Dr Donald King, Head of Vesicular Disease Reference Laboratories
Which of the following defines your laboratory? Check all that apply:	Research Academic

ToR 1: To use, promote and disseminate diagnostic methods validated according to OIE Standards

1. Did your laboratory perform diagnostic tests for the specified disease/topic for purposes such as disease diagnosis, screening of animals for export, surveillance, etc.? (Not for quality control, proficiency testing or staff training)

Yes

Diagnostic Test	Indicated in OIE Manual (Yes/No)	Total number of test performed last year	
		Nationally	Internationally
Indirect diagnostic tests			
Vaccine Matching	Yes	0	83
Virus Neutralisation Test	Yes	0	688
ELISA - Structural protein Antibody	Yes	0	100
ELISA - Non-structural protein Antibody	Yes	0	5
Direct diagnostic tests			
Virus Isolation	Yes	0	672
Antigen ELISA	Yes	0	463
real time RT-PCR	Yes	0	1232
VP1 region sequencing	Yes	0	431
Phylogenetic Analyses (sequences	Yes	0	94
Complete genome sequencing	No	0	25

**ToR 2: To develop reference material in accordance with OIE requirements, and implement and promote the application of OIE Standards.
To store and distribute to national laboratories biological reference products and any other reagents used in the diagnosis and control of the designated pathogens or disease.**

2. Did your laboratory produce or supply imported standard reference reagents officially recognised by the OIE?

Yes

NOTE: Currently, there are 22 laboratories that produce Standard Reference Reagents officially recognised by the OIE for 19 diseases/pathogens. Please click the following link to the list of OIE-approved International Standard Sera: <http://www.oie.int/en/our-scientific-expertise/veterinary-products/reference-reagents/>. If the reagent is not listed on this page, it is NOT considered OIE-approved. The next two questions allow you to indicate non-OIE-approved diagnostic reagents.

OIE-approved SRR producing laboratory – Select your lab from list:

Disease	Test	Available from
Foot and mouth disease	Enzyme-linked immunosorbent assay (antigen and antibody detection); Virus neutralisation	Dr Donald King Institute for Animal Health, Pirbright Laboratory, Ash Road, Pirbright, Woking, Surrey GU24 0NF, United Kingdom Tel: (44-1483) 23.24.41 Fax: (44-1483) 23.24.48 donald.king@pirbright.ac.uk

Type of reagent available	Related diagnostic test	Produced/ Supply imported	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	Name of recipient OIE Member Countries
Reagents	ELISA serology tests	Produced	<input checked="" type="radio"/> <10mL <input type="radio"/> 10-100mL <input type="radio"/> 100-500mL <input type="radio"/> >500mL	<input type="radio"/> <10mL <input type="radio"/> 10-100mL <input checked="" type="radio"/> 100-500mL <input type="radio"/> >500mL	CHINESE TAIPEI FRANCE GERMANY IRAQ KOREA (REP. OF) MALAYSIA SWITZERLAND THE NETHERLANDS VIETNAM

3. Did your laboratory supply standard reference reagents (non OIE-approved) and/or other diagnostic reagents to OIE Member Countries?

Yes

Type of reagent available	Related diagnostic test	Produced/ provide	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	No. of recipient OIE Member Countries	Region of recipients
Virus Isolates	FMD virus detection tests	Produced	122.2	72	4	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to OIE Member Countries?

No

ToR 3: To develop, standardise and validate, according to OIE Standards, new procedures for diagnosis and control of the designated pathogens or diseases

6. Did your laboratory develop new diagnostic methods validated according to OIE Standards for the designated pathogen or disease?

No

7. Did your laboratory develop new vaccines according to OIE Standards for the designated pathogen or disease?

No

ToR 4: To provide diagnostic testing facilities, and, where appropriate, scientific and technical advice on disease control measures to OIE Member Countries

8. Did your laboratory carry out diagnostic testing for other OIE Member Countries?

Yes

Name of OIE Member Country seeking assistance	Date (month)	No. samples received for provision of diagnostic support	No. samples received for provision of confirmatory diagnoses
ALGERIA	January, April	0	11
BHUTAN	April	0	34
COTE D'IVOIRE	April	0	3
EGYPT	February	0	36
ETHIOPIA	March, May	0	90
GUINEA	April	0	3
ISRAEL	February, June	0	111
MAURITANIA	April	0	1
MONGOLIA	February	0	7
MOROCCO	April	0	4
MYANMAR	June	0	15
NEPAL	May	0	50
PAKISTAN	August	0	36
SAUDI ARABIA	March	0	11
KOREA (REP. OF)	February	0	5
THAILAND	September	0	20
TUNISIA	April	0	2
TURKEY	May	0	40
UGANDA	March	0	52
VIETNAM	March	0	55
ZAMBIA	May	0	12
CHINA (PEOPLE'S REP. OF)	February, August	0	13

9. Did your laboratory provide expert advice in technical consultancies on the request of an OIE Member Country?

No

ToR 5: To carry out and/or coordinate scientific and technical studies in collaboration with other laboratories, centres or organisations

10. Did your laboratory participate in international scientific studies in collaboration with OIE Member Countries other than the own?

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	OIE Member Countries involved other than your country
Development of vaccine matching tests for Southeast Asia	3 years	Improvement of serological tests for vaccine matching	Malaysian Government	MALAYSIA
Validation of RT-PCR methods for milk	4 years	Validation of RT-PCR methods for milk	Embakasi (Kenya) Iranian Vet Org (Iran)	IRAN KENYA
Development of FMD ELISA tests	on-going	on-going new ELISA tests for FMD diagnosis	IZSLER (Italy)	ITALY
Improved tools for the surveillance and diagnosis of FMD	5 years	Understanding the epidemiology of FMD in endemic settings	SUA (Tanzania) and TVLA (Tanzania)	TANZANIA
OIE Twinning Project	3 years	Improved diagnostic capacity for Ethiopia	NAHDIC (Ethiopia)	ETHIOPIA
Development of new vaccine matching tests for FMD	1 year	Generate validation data for field tests	INTA, Argentina	ARGENTINA
Validation of NSP tests	1 year	Inter-laboratory exercise for NSP assays	IZSLER (Italy), ANSES (France), Lelystad (The Netherlands)	FRANCE ITALY THE NETHERLANDS
OIE Twinning Project	2 Years	Vaccine QA/QC for Africa	AU-PANVAC	

ToR 6: To collect, process, analyse, publish and disseminate epizootiological data relevant to the designated pathogens or diseases

11. Did your Laboratory collect epizootiological data relevant to international disease control?

Yes

If the answer is yes, please provide details of the data collected:
Epizootiological data relating to the samples submitted for confirmatory diagnostic testing (see ToR4) was collected.

12. Did your laboratory disseminate epizootiological data that had been processed and analysed?

Yes

If the answer is yes, please provide details of the data collected:
Individual reports are communicated to the OIE (via email) and a summary report of testing completed is submitted to the OIE on a quarterly basis (see: https://www.wrlfmd.org/ref-lab-reports)

**13. What method of dissemination of information is most often used by your laboratory?
(Indicate in the appropriate box the number by category)**

a) Articles published in peer-reviewed journals: 13

1. Armson, B., J. Wadsworth, T. Kibona, D. Mshanga, V.L. Fowler, N.J. Knowles, V. Mioulet, R. Reeve, D.P. King, K. Bachanek-Bankowska, and T. Lembo (2019). Opportunities for enhanced surveillance of Foot-and-mouth disease in endemic settings using milk samples. *Transboundary and Emerging Diseases*, 66(3): 1405-1410.

2. Bachanek-Bankowska, K., J. Wadsworth, E. Henry, A.B. Ludi, A. Bin-Tarif, B. Statham, D.P. King, M. Afzal, M. Hussain, S. Manzoor, M. Abubakar, and N.J. Knowles (2019). Genome sequences of antigenically distinct serotype O foot-and-mouth disease viruses from Pakistan. *Microbiology Resource Announcements*, 8(3): 2.

3. Bachanek-Bankowska, K., A. Di Nardo, J. Wadsworth, D. King, and N. Knowles (2019). Reconstructing the evolutionary history of pandemic Foot-and-mouth disease viruses: The impact of recombination within the emerging O/ME-SA/Ind-2001 lineage. *Virus Evolution*, 5: S15-S15.

4. Bo, L.L., K.S. Lwin, S. Ungvanijban, N.J. Knowles, J. Wadsworth, D.P. King, R. Abila, and Y. Qiu (2019). Foot-and-mouth disease outbreaks due to an exotic serotype Asia 1 virus in Myanmar in 2017. *Transboundary and Emerging Diseases*, 66(2): 1067-1072.

5. Cortey, M., L. Ferretti, E. Perez-Martin, F.Q. Zhang, L.M. de Klerk-Lorist, K. Scott, G. Freimanis, J. Seago, P. Ribeca, L. van Schalkwyk, N.D. Juleff, F.F. Maree, and B. Charleston (2019). Persistent infection of African buffalo (*Syncerus caffer*) with Foot-and-mouth disease virus: limited viral evolution and no evidence of antibody neutralization escape. *Journal of Virology*, 93(15): 15.

6. Lycett, S., V.N. Tanya, M. Hall, D.P. King, S. Mazeri, V. Mioulet, N.J. Knowles, J. Wadsworth, K. Bachanek-Bankowska, V.N. Ngwa, K.L. Morgan, and B.M.D. Bronsvort (2019). The evolution and phylodynamics of serotype A and SAT2 foot-and-mouth disease viruses in endemic regions of Africa. *Scientific Reports*, 9: 11.

7. Lyons, N.A., T.J.D. Knight-Jones, C. Bartels, D.J. Paton, G. Ferrari, M.S. Vermillion, A.W. Brooks, R. Motroni, E. Parker, M.L.H. Berquist, K.J. Sumption, and E. Klement (2019). Considerations for design and implementation of vaccine field trials for novel foot-and-mouth disease vaccines. *Vaccine*, 37(8): 1007-1015.

8. Mahapatra, M., S. Upadhyaya, and S. Parida (2019). Identification of novel epitopes in serotype O Foot-and-mouth disease virus by in vitro immune selection. *Journal of General Virology*, 100(5): 804-811.

9. Nyaguthii, D.M., B. Armson, P.M. Kitale, B. Sanz-Bernardo, A. Di Nardo, and N.A. Lyons (2019). Knowledge and risk factors for Foot-and-mouth disease among small-scale dairy farmers in an endemic setting. *Veterinary Research*, 50: 12.

10. Paton, D.J., R. Reeve, A.V. Capozzo, and A. Ludi (2019). Estimating the protection afforded by Foot-and-mouth disease vaccines in the laboratory. *Vaccine*, 37(37): 5515-5524.

11. Pezzoni, G., A. Bregoli, S. Grazioli, I. Barbieri, H. Madani, A. Omani, H. Sadaoui, N. Bouayed, J. Wadsworth, K. Bachanek-Bankowska, N.J. Knowles, D.P. King, and E. Brocchi (2019). Foot-and-mouth disease outbreaks due to an exotic virus serotype A lineage (A/AFRICA/G-IV) in Algeria in 2017. *Transboundary and Emerging Diseases*, 66(1): 7-13.

12. Ranaweera, L.T.H., U.K. Wijesundara, H.S.M. Jayarathne, N. Knowles, J. Wadsworth, V. Mioulet, J. Adikari, C. Weebadde, and S.S. Sooriyapathirana (2019). Characterization of the FMDV-serotype-O isolates collected during 1962 and 1997 discloses new topotypes, CEY-1 and WCSA-1, and six new lineages. *Scientific Reports*, 9.

13. Teye, M.V., T.K. Sebunya, E.M. Fana, D.P. King, L. Seoke, N.J. Knowles, J.A. Awuni, G. Matlho, M. Leteane, and J.M.K. Hyera (2019). Foot-and-mouth disease in Southern Ghana: occurrence and molecular characterization of circulating viruses. *Tropical Animal Health and Production*, 51(6): 1667-1677.

b) International conferences: 8

[1] King D. P. and Ludi A. Update on the current FMD global situation. GFRA, Bangkok, Thailand, October 2019.

[2] Vosloo W., Eblé P., Singanallur N., King D. P., Ludi A. and Dekker A. Low protection with an A/ASIA/G-VII lineage FMDV emergency vaccine against an FMDV A/ASIA/Iran-05 lineage virus challenge. GFRA, Bangkok, Thailand, October 2019.

[3] Wadsworth J., Di Nardo A., Bachanek-Bankowska K., Benfrid S., Blaise-Boisseau S., Delannoy S., Shaw A. E., Mioulet V., Romey A., Relmy A., Fach P., Bakkali Kassimi L., King D. P. and Knowles N. J. Complete genome analyses of foot-and-mouth disease viruses belonging to serotypes O, A and SAT 2 in East, West and North Africa. GFRA, Bangkok, Thailand, October 2019.

[4] Di Nardo A., Wadsworth J., Mioulet V., Ferretti L., Haydon D., King D. P. and Knowles N. J. Evolutionary competition drives the emergence and extinction of foot-and-mouth disease virus lineages. GFRA, Bangkok, Thailand, October 2019.

[5] Morris A., Browning C., Grazioli S., Pezzoni G., Wilsden G., Gubbins S., Burman A., Brocchi E., King D. P. and Ludi A. Understanding serotype cross-reactivity of antibody ELISAs and the impact on interpretation. GFRA, Bangkok, Thailand, October 2019.

[6] Senawi J., Gubbins S., Reeve R., Bachanek-Bankowska K., Ludi A. and King D. P. In vitro vaccine matching for foot-and-mouth disease virus: does bovine vaccinal sera impact upon the reliability of serological immune responses. GFRA, Bangkok, Thailand, October 2019.

[7] Benfrid S., Blaise-Boisseau S., Wadsworth J., Di Nardo A., Shaw A., Romey A., Relmy A., Faucheux R., Mioulet V., King D. P., Knowles N. J. and Bakkali Kassimi L. Molecular epidemiology of foot-and-mouth disease virus O/EA-3: A recent transboundary emergence in North Africa (2017-2019). GFRA, Bangkok, Thailand, October 2019.

[8] Kasanga C. J., Kandusi S., Msomi A., Juma R., Mpete H., Sallu R., Mkama M., Knowles N. J., Wadsworth J., Mioulet V., Di Nardo A., Paton D., Wambura P. N., Rweyemamu M. M. and King D. P. Molecular characterisation of foot-and-mouth viruses detected during 2015-2019 in Tanzania: insights for virus evolution in endemic settings in Africa. GFRA, Bangkok, Thailand, October 2019.

c) National conferences: 0

None

d) Other:

(Provide website address or link to appropriate information) 3

Website: www.wrlfmd.org

Website: www.foot-and-mouth.org/

twitter account: <https://twitter.com/WRLFMD>

ToR 7: To provide scientific and technical training for personnel from OIE Member Countries

To recommend the prescribed and alternative tests or vaccines as OIE Standards

14. Did your laboratory provide scientific and technical training to laboratory personnel from other OIE Member Countries?

Yes

- a) Technical visits: 2
 b) Seminars: 2
 c) Hands-on training courses: 3
 d) Internships (>1 month): 0

Type of technical training provided (a, b, c or d)	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
a	West African Countries	>10
a	North African Countries	>10
b	E-learning training and supporting Webinars on FMD diagnostics provided internationally (participants from 55 different countries)	>100
b	E-Learning training on post-vaccination monitoring (with summer school) for FMDV	>30
c	Oman	1
c	New Zealand	1
c	Brundi	1
c	DR Congo	1
c	Eritrea	1
c	Kenya	1
c	Rwanda	1
c	South Sudan	1
c	Tanzania	1
c	Uganda	1
c	Ethiopia	5
c	AU-PANVAC	1

ToR 8: To maintain a system of quality assurance, biosafety and biosecurity relevant for the pathogen and the disease concerned

15. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)
ISO/IEC 17025:2005	17025 Testing schedule.pdf

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Identification of Foot-and-Mouth Disease Virus (FMDV) and related vesicular viruses	United Kingdom Accreditation
Detection of Antibodies to structural and non-structural proteins of Foot-and-Mouth Disease (FMDV)	United Kingdom Accreditation
Detection of antibodies to Vesicular and related viruses	United Kingdom Accreditation
Detection of antibodies to Structural proteins of Foot-and-Mouth Disease (FMDV)	United Kingdom Accreditation
Detection of antibodies to Non-structural protein of Foot and Mouth Disease Virus (FMDV)	United Kingdom Accreditation
Detection and identification of Foot and Mouth Disease Virus (FMDV) & Swine Vesicular Disease Virus (SVDV)	United Kingdom Accreditation
Efficacy Testing against Swine Vesicular Disease Virus, Foot and Mouth Disease Virus	United Kingdom Accreditation

17. Does your laboratory maintain a "biorisk management system" for the pathogen and the disease concerned?

Yes

(See *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, Chapter 1.1.4*)

ToR 9: To organise and participate in scientific meetings on behalf of the OIE

18. Did your laboratory organise scientific meetings on behalf of the OIE?

Yes

National/ International	Title of event	Co-organiser	Date (mm/yy)	Location	No. Participants
International	14th OIE/FAO FMD Reference Laboratories Network Annual Meeting	APQA, South Korea	12/19	Busan, South Korea	>30

19. Did your laboratory participate in scientific meetings on behalf of the OIE?

Yes

Title of event	Date (mm/yy)	Location	Role (speaker, presenting poster, short communications)	Title of the work presented
Scientific Committee on Animal Diseases (SCAD)	02/19	OIE, Paris	Speaker	FMD update for 2018/19
OIE/FAO FMD Roadmap meeting	03/19	Shiraz, Iran	Speaker	Regional risks for FMD
OIE SEACFMD (22nd National Coordinators Meeting)	06/19	Ulaanbaatar, Mongolia	Speaker	Outbreaks and serological testing
Second OIE/FAO GF-TADS FMD Roadmap meeting for West Africa	09/2019	Dakar, Senegal	Speaker	FMD in West Africa
1st Middle East FMD Epidemiology and Laboratory Networks Meeting	11/2019	Cairo	Speaker	Talks on regional risks, biosafety and diagnostics

ToR 10: To establish and maintain a network with other OIE Reference Laboratories designated for the same pathogen or disease and organise regular inter-laboratory proficiency testing to ensure comparability of results

20. Did your laboratory exchange information with other OIE Reference Laboratories designated for the same pathogen or disease?

Yes

21. Was your laboratory involved in maintaining a network with OIE Reference Laboratories designated for the same pathogen or disease by organising or participating in proficiency tests?

Yes

Purpose of the proficiency tests: ¹	Role of your Reference Laboratory (organiser/participant)	No. participants	Participating OIE Ref. Labs/ organising OIE Ref. Lab.
Panel 1 – Outbreak scenarios for vesicular diseases (including FMD and SVD)	organiser	10	Botswana, Brazil, China, France, Italy, Russia, South Africa, Thailand, United Kingdom (Organising laboratory), United States of America
Panel 2 – QA panel (FMDV samples)	organiser	10	Botswana, Brazil, China, France, Italy, Russia, South Africa, Thailand, United Kingdom (Organising laboratory), United States of America
Panel 3 – Continuation of outbreak scenarios for vesicular diseases	organiser	10	Botswana, Brazil, China, France, Italy, Russia, South Africa, Thailand, United Kingdom (Organising laboratory), United States of America
Panel 4 – QA Panel	organiser	10	Botswana, Brazil, China, France, Italy, Russia, South Africa, Thailand, United Kingdom (Organising laboratory), United States of America

¹ validation of a diagnostic protocol: specify the test; quality control of vaccines: specify the vaccine type, etc.

22. Did your laboratory collaborate with other OIE Reference Laboratories for the same disease on scientific research projects for the diagnosis or control of the pathogen of interest?

Yes

Title of the project or contract	Scope	Name(s) of relevant OIE Reference Laboratories
Development of FMD ELISA tests	Apply new technologies for molecular epidemiology	IZSLER (Italy)
Validation of NSP assays	Inter-laboratory exercise for commercial assays	ANSES (France) and IZSLER (Italy)

ToR 11: To organise inter-laboratory proficiency testing with laboratories other than OIE Reference Laboratories for the same pathogens and diseases to ensure equivalence of results

23. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than OIE Reference Laboratories for the same disease?

Yes

Note: See Interlaboratory test comparisons in: Laboratory Proficiency Testing at:

<http://www.oie.int/en/our-scientific-expertise/reference-laboratories/proficiency-testing> see point 1.3

Purpose for inter-laboratory test comparisons ¹	No. participating laboratories	Region(s) of participating OIE Member Countries
Panel 1 - Outbreak scenarios for vesicular diseases (including FMD and SVD)	63	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East
Panel 2 - QA panel (FMDV samples)	67	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East
Panel 3 - Continuation of outbreak scenarios for vesicular diseases	67	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East
Panel 4 - QA Panel	69	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East

ToR 12: To place expert consultants at the disposal of the OIE

24. Did your laboratory place expert consultants at the disposal of the OIE?

Yes

Kind of consultancy	Location	Subject (facultative)
OIE ad hoc Group	Paris	Review of dossiers

25. Additional comments regarding your report: